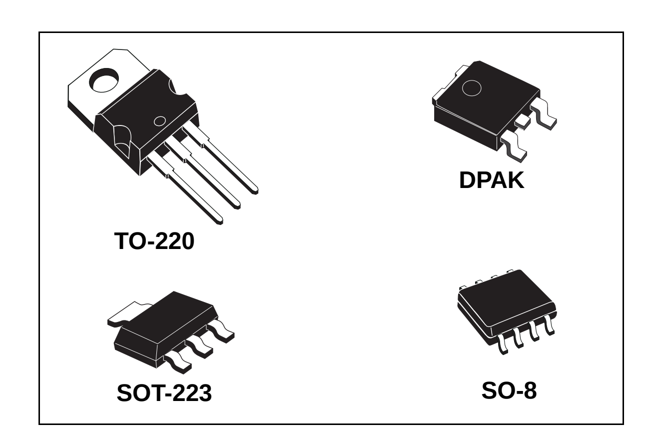


LD1117

Adjustable and fixed low drop positive voltage regulator

Datasheet - production data



Features

- Low dropout voltage (1 V typ.)
- 2.85 V device performances are suitable for SCSI-2 active termination
- Output current up to 800 mA
- Fixed output voltage of: 1.2 V, 1.8 V, 2.5 V, 3.3 V, 5.0 V
- Adjustable version availability (V_{REF} = 1.25 V)
- Internal current and thermal limit
- Available in ± 1 % (at 25 °C) and 2 % in full temperature range
- Supply voltage rejection: 75 dB (typ.)

Description

The LD1117 is a low drop voltage regulator able to provide up to 800 mA of output current, available even in adjustable version (V_{REF} = 1.25 V). Concerning fixed versions, are offered the following output voltages: 1.2 V, 1.8 V, 2.5 V, 2.85 V, 3.3 V and 5.0 V. The device is supplied in: SOT-223, DPAK, SO-8 and TO-220. The SOT-223 and DPAK surface mount packages optimize the thermal characteristics even offering a relevant space saving effect. High efficiency is assured by NPN pass transistor. In fact in this case, unlike than PNP one, the quiescent current flows mostly into the load. Only a very common 10 µF minimum capacitor is needed for stability. On chip trimming allows the regulator to reach a very tight output voltage tolerance, within ± 1 % at 25 °C. The adjustable LD1117 is pin to pin compatible with the other standard. Adjustable voltage regulators maintaining the better performances in terms of drop and tolerance.

This is information on a product in full production. www.st.com

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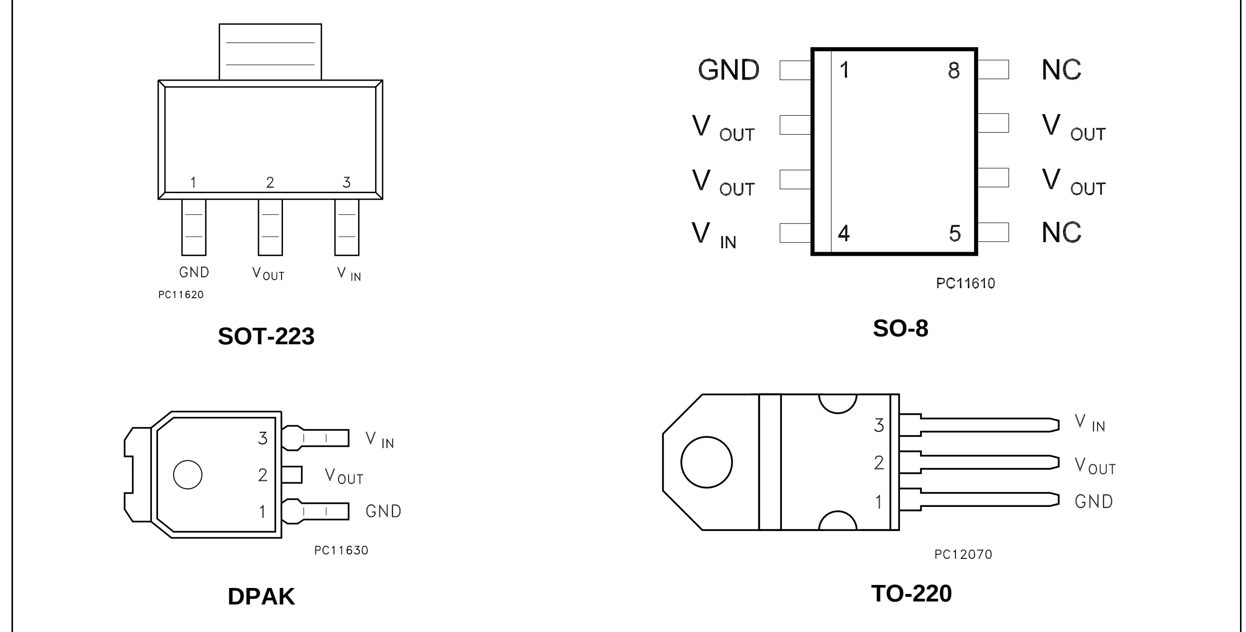
1 Diagram

Figure 1. Block diagram

VIN
VOLTAGE GENERATOR
+
-
CURRENT GENERATOR
THERMAL COMPENSATION
THERMAL PROTECTION
VOUT
GND
SC08251

2 Pin configuration

Figure 2. Pin connections (top view)



Note: The TAB is connected to the V_{OUT}.

3 Maximum ratings

Table 1. Absolute maximum ratings

Symbol	Parameter		Value	Unit
V_{IN} (1)	DC input voltage		15	V
P_{TOT}	Power dissipation		12	W
T_{STG}	Storage temperature range		-40 to +150	°C
T_{OP}	Operating junction temperature range	for C version	-40 to +125	°C
		for standard version	0 to +125	°C

1. Absolute maximum rating of V_{IN} = 18 V, when I_{OUT} is lower than 20 mA.

Table 2. Thermal data

Symbol	Parameter	SOT-223	SO-8	DPAK	TO-220	Unit
R_{thJC}	Thermal resistance junction-case	15	20	8	5	°C/W
R_{thJA}	Thermal resistance junction-ambient	110	55	100	50	°C/W

4 Schematic application

Figure 3. Application circuit (for 1.2 V)

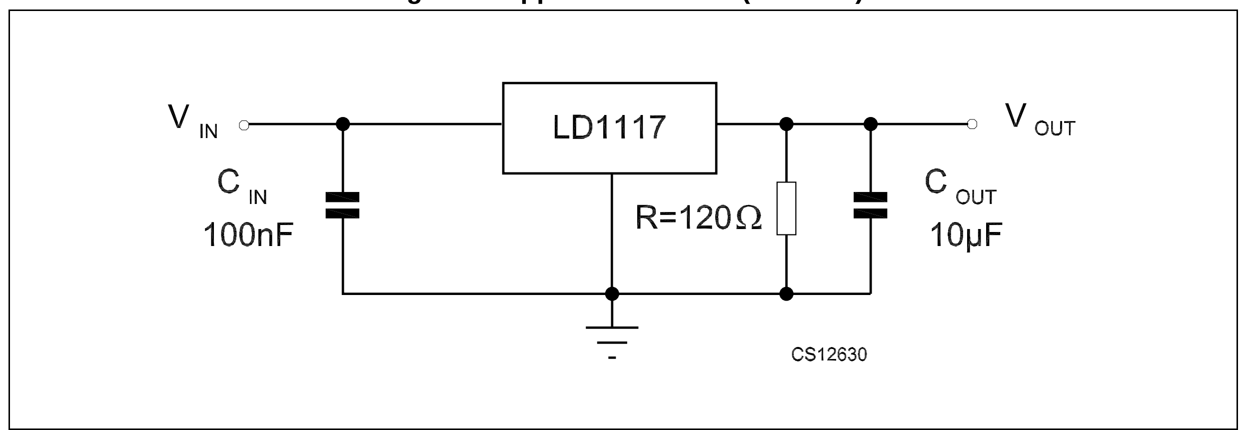
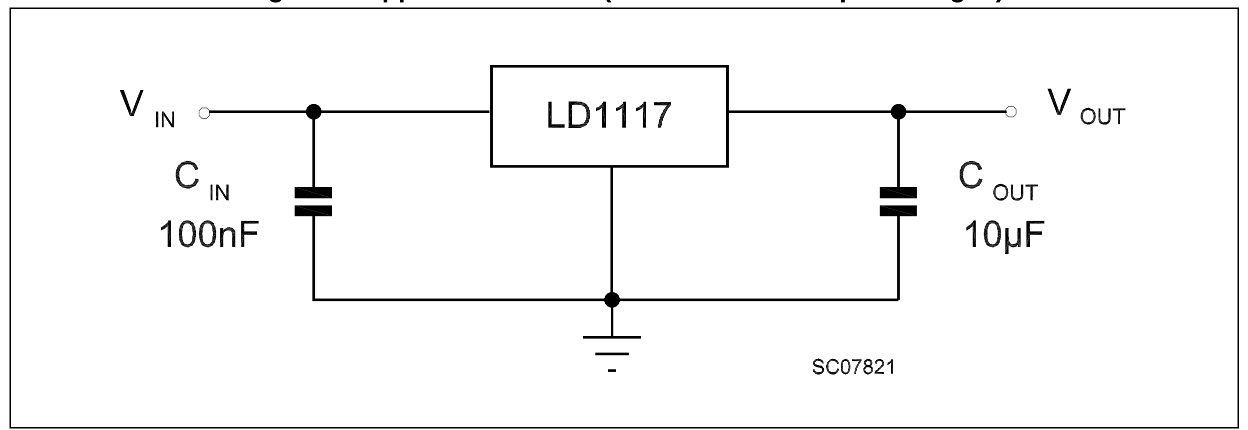


Figure 4. Application circuit (for other fixed output voltages)



5 Electrical characteristics

Refer to the test circuits, T_J = 0 to 125 °C, C_O = 10 µF, R = 120 Ω between GND and OUT pins, unless otherwise specified.

Table 3. Electrical characteristics of LD1117#12

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_O	Output voltage	V_{in} = 3.2 V, I_O = 10 mA, T_J = 25 °C	1.188	1.20	1.212	V
V_O	Output voltage	I_O = 10 to 800 mA $V_{in} - V_O$ = 1.4 to 10 V	1.140	1.20	1.260	V
ΔV_O	Line regulation	$V_{in} - V_O$ = 1.5 to 13.75 V, I_O = 10 mA		0.035	0.2	%
ΔV_O	Load regulation	$V_{in} - V_O$ = 3 V, I_O = 10 to 800 mA		0.1	0.4	%
ΔV_O	Temperature stability			0.5		%
ΔV_O	Long term stability	1000 hrs, T_J = 125 °C		0.3		%
V_{in}	Operating input voltage				15	V
I_{adj}	Adjustment pin current	$V_{in} \leq 15$ V		60	120	µA
ΔI_{adj}	Adjustment pin current change	$V_{in} - V_O$ = 1.4 to 10 V I_O = 10 to 800 mA		1	5	µA
$I_{O(min)}$	Minimum load current	V_{in} = 15 V		2	5	mA
I_O	Output current	$V_{in} - V_O$ = 5 V, T_J = 25 °C	800	950	1300	mA
eN	Output noise (%V_O)	B = 10 Hz to 10 kHz, T_J = 25 °C		0.003		%
SVR	Supply voltage rejection	I_O = 40 mA, f = 120 Hz, T_J = 25 °C $V_{in} - V_O$ = 3 V, V_{ripple} = 1 V_{PP}	60	75		dB
V_d	Dropout voltage	I_O = 100 mA		1	1.1	V
		I_O = 500 mA		1.05	1.15	
		I_O = 800 mA		1.10	1.2	
	Thermal regulation	T_a = 25 °C, 30 ms Pulse		0.01	0.1	%/W

Refer to the test circuits, T_J = 0 to 125 °C, C_O = 10 µF, unless otherwise specified.

Table 4. Electrical characteristics of LD1117#18

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_O	Output voltage	V_{in} = 3.8 V, I_O = 10 mA, T_J = 25 °C	1.78	1.8	1.82	V
V_O	Output voltage	I_O = 0 to 800 mA, V_{in} = 3.3 to 8 V	1.76		1.84	V
ΔV_O	Line regulation	V_{in} = 3.3 to 8 V, I_O = 0 mA		1	6	mV
ΔV_O	Load regulation	V_{in} = 3.3 V, I_O = 0 to 800 mA		1	10	mV
ΔV_O	Temperature stability			0.5		%
ΔV_O	Long term stability	1000 hrs, T_J = 125 °C		0.3		%
V_{in}	Operating input voltage	I_O = 100 mA			15	V
I_d	Quiescent current	$V_{in} \leq 8$ V		5	10	mA
I_O	Output current	V_{in} = 6.8 V, T_J = 25 °C	800	950	1300	mA
eN	Output noise voltage	B = 10 Hz to 10 kHz, T_J = 25 °C		100		µV
SVR	Supply voltage rejection	I_O = 40 mA, f = 120 Hz, T_J = 25 °C V_{in} = 5.5 V, V_{ripple} = 1 V_{PP}	60	75		dB
V_d	Dropout voltage	I_O = 100 mA		1	1.1	V
		I_O = 500 mA		1.05	1.15	
		I_O = 800 mA		1.10	1.2	
	Thermal regulation	T_a = 25 °C, 30 ms Pulse		0.01	0.1	%/W

Refer to the test circuits, T_J = 0 to 125 °C, C_O = 10 µF, unless otherwise specified.

Table 5. Electrical characteristics of LD1117#25

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_O	Output voltage	V_{in} = 4.5 V, I_O = 10 mA, T_J = 25 °C	2.475	2.5	2.525	V
V_O	Output voltage	I_O = 0 to 800 mA, V_{in} = 3.9 to 10 V	2.45		2.55	V
ΔV_O	Line regulation	V_{in} = 3.9 to 10 V, I_O = 0 mA		1	6	mV
ΔV_O	Load regulation	V_{in} = 3.9 V, I_O = 0 to 800 mA		1	10	mV
ΔV_O	Temperature stability			0.5		%
ΔV_O	Long term stability	1000 hrs, T_J = 125 °C		0.3		%
V_{in}	Operating input voltage	I_O = 100 mA			15	V
I_d	Quiescent current	$V_{in} \leq$ 10 V		5	10	mA
I_O	Output current	V_{in} = 7.5 V T_J = 25 °C	800	950	1300	mA
eN	Output noise voltage	B = 10 Hz to 10 kHz, T_J = 25 °C		100		µV
SVR	Supply voltage rejection	I_O = 40 mA, f = 120 Hz, T_J = 25 °C V_{in} = 5.5 V, V_{ripple} = 1 V_{PP}	60	75		dB
V_d	Dropout voltage	I_O = 100 mA		1	1.1	V
		I_O = 500 mA		1.05	1.15	
		I_O = 800 mA		1.10	1.2	
	Thermal regulation	T_a = 25 °C, 30 ms Pulse		0.01	0.1	%/W

Refer to the test circuits, T_J = 0 to 125 °C, C_O = 10 µF, unless otherwise specified.

Table 6. Electrical characteristics of LD1117#33

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_O	Output voltage	V_{in} = 5.3 V, I_O = 10 mA, T_J = 25 °C	3.267	3.3	3.333	V
V_O	Output voltage	I_O = 0 to 800 mA, V_{in} = 4.75 to 10 V	3.235		3.365	V
ΔV_O	Line regulation	V_{in} = 4.75 to 15 V, I_O = 0 mA		1	6	mV
ΔV_O	Load regulation	V_{in} = 4.75 V, I_O = 0 to 800 mA		1	10	mV
ΔV_O	Temperature stability			0.5		%
ΔV_O	Long term stability	1000 hrs, T_J = 125 °C		0.3		%
V_{in}	Operating input voltage	I_O = 100 mA			15	V
I_d	Quiescent current	$V_{in} \leq$ 15 V		5	10	mA
I_O	Output current	V_{in} = 8.3 V, T_J = 25 °C	800	950	1300	mA
eN	Output noise voltage	B = 10 Hz to 10 kHz, T_J = 25 °C		100		µV
SVR	Supply voltage rejection	I_O = 40 mA, f = 120 Hz, T_J = 25 °C V_{in} = 6.3 V, V_{ripple} = 1 V_{PP}	60	75		dB
V_d	Dropout voltage	I_O = 100 mA		1	1.1	V
		I_O = 500 mA		1.05	1.15	
		I_O = 800 mA		1.10	1.2	
	Thermal regulation	T_a = 25 °C, 30 ms Pulse		0.01	0.1	%/W

Refer to the test circuits, T_J = 0 to 125 °C, C_O = 10 µF, unless otherwise specified.

Table 7. Electrical characteristics of LD1117#50

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_O	Output voltage	V_{in} = 7 V, I_O = 10 mA, T_J = 25 °C	4.95	5	5.05	V
V_O	Output voltage	I_O = 0 to 800 mA, V_{in} = 6.5 to 15 V	4.9		5.1	V
ΔV_O	Line regulation	V_{in} = 6.5 to 15 V, I_O = 0 mA		1	10	mV
ΔV_O	Load regulation	V_{in} = 6.5 V, I_O = 0 to 800 mA		1	15	mV
ΔV_O	Temperature stability			0.5		%
ΔV_O	Long term stability	1000 hrs, T_J = 125 °C		0.3		%
V_{in}	Operating input voltage	I_O = 100 mA			15	V
I_d	Quiescent current	$V_{in} \leq$ 15 V		5	10	mA
I_O	Output current	V_{in} = 10 V, T_J = 25 °C	800	950	1300	mA
eN	Output noise voltage	B = 10 Hz to 10 kHz, T_J = 25 °C		100		µV
SVR	Supply voltage rejection	I_O = 40 mA, f = 120 Hz, T_J = 25 °C V_{in} = 8 V, V_{ripple} = 1 V_{PP}	60	75		dB
V_d	Dropout voltage	I_O = 100 mA		1	1.1	V
		I_O = 500 mA		1.05	1.15	
		I_O = 800 mA		1.10	1.2	
	Thermal regulation	T_a = 25 °C, 30 ms Pulse		0.01	0.1	%/W

Refer to the test circuits, T_J = 0 to 125 °C, C_O = 10 µF, unless otherwise specified.

Table 8. Electrical characteristics of LD1117 (adjustable)

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_{ref}	Reference voltage	V_{in} - V_O = 2 V, I_O = 10 mA, T_J = 25 °C	1.238	1.25	1.262	V
V_{ref}	Reference voltage	I_O = 10 to 800 mA, V_{in} - V_O = 1.4 to 10 V	1.225		1.275	V
ΔV_O	Line regulation	V_{in} - V_O = 1.5 to 13.75 V, I_O = 10 mA		0.035	0.2	%
ΔV_O	Load regulation	V_{in} - V_O = 3 V, I_O = 10 to 800 mA		0.1	0.4	%
ΔV_O	Temperature stability			0.5		%
ΔV_O	Long term stability	1000 hrs, T_J = 125 °C		0.3		%
V_{in}	Operating input voltage				15	V
I_{adj}	Adjustment pin current	$V_{in} \leq$ 15 V		60	120	µA
ΔI_{adj}	Adjustment pin current change	V_{in} - V_O = 1.4 to 10 V, I_O = 10 to 800 mA		1	5	µA
$I_{O(min)}$	Minimum load current	V_{in} = 15 V		2	5	mA
I_O	Output current	V_{in} - V_O = 5 V, T_J = 25 °C	800	950	1300	mA
eN	Output noise (%V_O)	B = 10 Hz to 10 kHz, T_J = 25 °C		0.003		%
SVR	Supply voltage rejection	I_O = 40 mA, f = 120 Hz, T_J = 25 °C V_{in} - V_O = 3 V, V_{ripple} = 1 V_{PP}	60	75		dB
V_d	Dropout voltage	I_O = 100 mA		1	1.1	V
		I_O = 500 mA		1.05	1.15	
		I_O = 800 mA		1.10	1.2	
	Thermal regulation	T_a = 25 °C, 30 ms Pulse		0.01	0.1	%/W

Refer to the test circuits, T_J = -40 to 125 °C, C_O = 10 µF, R = 120 Ω between GND and OUT pins, unless otherwise specified.

Table 9. Electrical characteristics of LD1117#12C

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_O	Output voltage	V_{in} - V_O = 2 V, I_O = 10 mA, T_J = 25 °C	1.176	1.20	1.224	V
V_O	Output voltage	I_O = 10 to 800 mA, V_{in} - V_O = 1.4 to 10 V	1.120	1.20	1.280	V
ΔV_O	Line regulation	V_{in} - V_O = 1.5 to 13.75 V, I_O = 10 mA			1	%
ΔV_O	Load regulation	V_{in} - V_O = 3 V, I_O = 10 to 800 mA			1	%
ΔV_O	Temperature stability			0.5		%
ΔV_O	Long term stability	1000 hrs, T_J = 125 °C		0.3		%
V_{in}	Operating input voltage				15	V
I_{adj}	Adjustment pin current	$V_{in} \leq 15$ V		60	120	µA
ΔI_{adj}	Adjustment pin current change	V_{in} - V_O = 1.4 to 10 V I_O = 10 to 800 mA		1	5	µA
$I_{O(min)}$	Minimum load current	V_{in} = 15 V		2	5	mA
I_O	Output current	V_{in} - V_O = 5 V, T_J = 25 °C	800	950	1300	mA
eN	Output noise (%V_O)	B = 10 Hz to 10 kHz, T_J = 25 °C		0.003		%
SVR	Supply voltage rejection	I_O = 40 mA, f = 120 Hz, T_J = 25 °C V_{in} - V_O = 3 V, V_{ripple} = 1 V_{PP}	60	75		dB
V_d	Dropout voltage	I_O = 100 mA, T_J = 0 to 125 °C		1	1.1	V
		I_O = 500 mA, T_J = 0 to 125 °C		1.05	1.2	
		I_O = 800 mA, T_J = 0 to 125 °C		1.10	1.3	
	Thermal regulation	T_a = 25 °C, 30 ms Pulse		0.01	0.1	%/W

Refer to the test circuits, T_J = -40 to 125 °C, C_O = 10 µF, unless otherwise specified.

Table 10. Electrical characteristics of LD1117#18C

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_O	Output voltage	V_{in} = 3.8 V, I_O = 10 mA, T_J = 25 °C	1.76	1.8	1.84	V
V_O	Output voltage	I_O = 0 to 800 mA, V_{in} = 3.9 to 10 V	1.73		1.87	V
ΔV_O	Line regulation	V_{in} = 3.3 to 8 V, I_O = 0 mA		1	30	mV
ΔV_O	Load regulation	V_{in} = 3.3 V, I_O = 0 to 800 mA		1	30	mV
ΔV_O	Temperature stability			0.5		%
ΔV_O	Long term stability	1000 hrs, T_J = 125 °C		0.3		%
V_{in}	Operating input voltage	I_O = 100 mA			15	V
I_d	Quiescent current	$V_{in} \leq 8$ V		5	10	mA
I_O	Output current	V_{in} = 6.8 V T_J = 25 °C	800	950	1300	mA
eN	Output noise voltage	B = 10 Hz to 10 kHz, T_J = 25 °C		100		µV
SVR	Supply voltage rejection	I_O = 40 mA, f = 120 Hz, T_J = 25 °C V_{in} = 5.5 V, V_{ripple} = 1 V_{PP}	60	75		dB
V_d	Dropout voltage	I_O = 100 mA, T_J = 0 to 125 °C		1	1.1	V
		I_O = 500 mA, T_J = 0 to 125 °C		1.05	1.15	
		I_O = 800 mA, T_J = 0 to 125 °C		1.10	1.2	
V_d	Dropout voltage	I_O = 100 mA			1.1	V
		I_O = 500 mA			1.2	
		I_O = 800 mA			1.3	
	Thermal regulation	T_a = 25 °C, 30 ms Pulse		0.01	0.1	%/W

Refer to the test circuits, T_J = -40 to 125 °C, C_O = 10 µF, unless otherwise specified.

Table 11. Electrical characteristics of LD1117#25C

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_O	Output voltage	V_{in} = 4.5 V, I_O = 10 mA, T_J = 25 °C	2.45	2.5	2.55	V
V_O	Output voltage	I_O = 0 to 800 mA, V_{in} = 3.9 to 10 V	2.4		2.6	V
ΔV_O	Line regulation	V_{in} = 3.9 to 10 V, I_O = 0 mA		1	30	mV
ΔV_O	Load regulation	V_{in} = 3.9 V, I_O = 0 to 800 mA		1	30	mV
ΔV_O	Temperature stability			0.5		%
ΔV_O	Long term stability	1000 hrs, T_J = 125 °C		0.3		%
V_{in}	Operating input voltage	I_O = 100 mA			15	V
I_d	Quiescent current	$V_{in} \leq 10$ V		5	10	mA
I_O	Output current	V_{in} = 7.5 V T_J = 25 °C	800	950	1300	mA
eN	Output noise voltage	B = 10 Hz to 10 kHz, T_J = 25 °C		100		µV
SVR	Supply voltage rejection	I_O = 40 mA, f = 120 Hz, T_J = 25 °C V_{in} = 5.5 V, V_{ripple} = 1 V_{PP}	60	75		dB
V_d	Dropout voltage	I_O = 100 mA, T_J = 0 to 125 °C		1	1.1	V
		I_O = 500 mA, T_J = 0 to 125 °C		1.05	1.15	
		I_O = 800 mA, T_J = 0 to 125 °C		1.10	1.2	
V_d	Dropout voltage	I_O = 100 mA			1.1	V
		I_O = 500 mA			1.2	
		I_O = 800 mA			1.3	
	Thermal regulation	T_a = 25 °C, 30 ms Pulse		0.01	0.1	%/W

Refer to the test circuits, T_J = -40 to 125 °C, C_O = 10 µF, unless otherwise specified.

Table 12. Electrical characteristics of LD1117#33C

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_O	Output voltage	V_{in} = 5.3 V, I_O = 10 mA, T_J = 25 °C	3.24	3.3	3.36	V
V_O	Output voltage	I_O = 0 to 800 mA, V_{in} = 4.75 to 10 V	3.16		3.44	V
ΔV_O	Line regulation	V_{in} = 4.75 to 15 V, I_O = 0 mA		1	30	mV
ΔV_O	Load regulation	V_{in} = 4.75 V, I_O = 0 to 800 mA		1	30	mV
ΔV_O	Temperature stability			0.5		%
ΔV_O	Long term stability	1000 hrs, T_J = 125 °C		0.3		%
V_{in}	Operating input voltage	I_O = 100 mA			15	V
I_d	Quiescent current	$V_{in} \leq$ 15 V		5	10	mA
I_O	Output current	V_{in} = 8.3 V, T_J = 25 °C	800	950	1300	mA
eN	Output noise voltage	B = 10 Hz to 10 kHz, T_J = 25 °C		100		µV
SVR	Supply voltage rejection	I_O = 40 mA, f = 120 Hz, T_J = 25 °C V_{in} = 6.3 V, V_{ripple} = 1 V_{PP}	60	75		dB
V_d	Dropout voltage	I_O = 100 mA, T_J = 0 to 125 °C		1	1.1	V
		I_O = 500 mA, T_J = 0 to 125 °C		1.05	1.15	
		I_O = 800 mA, T_J = 0 to 125 °C		1.10	1.2	
V_d	Dropout voltage	I_O = 100 mA			1.1	V
		I_O = 500 mA			1.2	
		I_O = 800 mA			1.3	
	Thermal regulation	T_a = 25 °C, 30 ms Pulse		0.01	0.1	%/W

Refer to the test circuits, T_J = -40 to 125 °C, C_O = 10 µF, unless otherwise specified.

Table 13. Electrical characteristics of LD1117#50C

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_O	Output voltage	V_{in} = 7 V, I_O = 10 mA, T_J = 25 °C	4.9	5	5.1	V
V_O	Output voltage	I_O = 0 to 800 mA, V_{in} = 6.5 to 15 V	4.8		5.2	V
ΔV_O	Line regulation	V_{in} = 6.5 to 15 V, I_O = 0 mA		1	50	mV
ΔV_O	Load regulation	V_{in} = 6.5 V, I_O = 0 to 800 mA		1	50	mV
ΔV_O	Temperature stability			0.5		%
ΔV_O	Long term stability	1000 hrs, T_J = 125 °C		0.3		%
V_{in}	Operating input voltage	I_O = 100 mA			15	V
I_d	Quiescent current	$V_{in} \leq 15$ V		5	10	mA
I_O	Output current	V_{in} = 10 V, T_J = 25 °C	800	950	1300	mA
eN	Output noise voltage	B = 10 Hz to 10 kHz, T_J = 25 °C		100		µV
SVR	Supply voltage rejection	I_O = 40 mA, f = 120 Hz, T_J = 25 °C V_{in} = 8 V, V_{ripple} = 1 V_{PP}	60	75		dB
V_d	Dropout voltage	I_O = 100 mA, T_J = 0 to 125 °C		1	1.1	V
		I_O = 500 mA, T_J = 0 to 125 °C		1.05	1.15	
		I_O = 800 mA, T_J = 0 to 125 °C		1.10	1.2	
V_d	Dropout voltage	I_O = 100 mA			1.1	V
		I_O = 500 mA			1.2	
		I_O = 800 mA			1.3	
	Thermal regulation	T_a = 25 °C, 30 ms Pulse		0.01	0.1	%/W

Refer to the test circuits, T_J = -40 to 125 °C, C_O = 10 µF, unless otherwise specified.

Table 14. Electrical characteristics of LD1117C (adjustable)

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_{ref}	Reference voltage	V_{in} - V_O = 2 V, I_O = 10 mA, T_J = 25 °C	1.225	1.25	1.275	V
V_{ref}	Reference voltage	I_O = 10 to 800 mA, V_{in} - V_O= 1.4 to 10 V	1.2		1.3	V
ΔV_O	Line regulation	V_{in} - V_O = 1.5 to 13.75 V, I_O = 10 mA			1	%
ΔV_O	Load regulation	V_{in} - V_O = 3 V, I_O = 10 to 800 mA			1	%
ΔV_O	Temperature stability			0.5		%
ΔV_O	Long term stability	1000 hrs, T_J = 125 °C		0.3		%
V_{in}	Operating input voltage				15	V
I_{adj}	Adjustment pin current	$V_{in} \leq$ 15 V		60	120	µA
ΔI_{adj}	Adjustment pin current change	V_{in} - V_O = 1.4 to 10 V, I_O = 10 to 800 mA		1	10	µA
$I_{O(min)}$	Minimum load current	V_{in} = 15 V		2	5	mA
I_O	Output current	V_{in} - V_O = 5 V, T_J = 25 °C	800	950	1300	mA
eN	Output noise (%V_O)	B = 10 Hz to 10 kHz, T_J = 25 °C		0.003		%
SVR	Supply voltage rejection	I_O = 40 mA, f = 120 Hz, T_J = 25 °C V_{in} - V_O = 3 V, V_{ripple} = 1 V_{PP}	60	75		dB
V_d	Dropout voltage	I_O = 100 mA, T_J = 0 to 125 °C		1	1.1	V
		I_O = 500 mA, T_J = 0 to 125 °C		1.05	1.15	
		I_O = 800 mA, T_J = 0 to 125 °C		1.10	1.2	
V_d	Dropout voltage	I_O = 100 mA			1.1	V
		I_O = 500 mA			1.2	
		I_O = 800 mA			1.3	
	Thermal regulation	T_a = 25 °C, 30 ms Pulse		0.01	0.1	%/W

6 Typical application

Figure 5. Negative supply

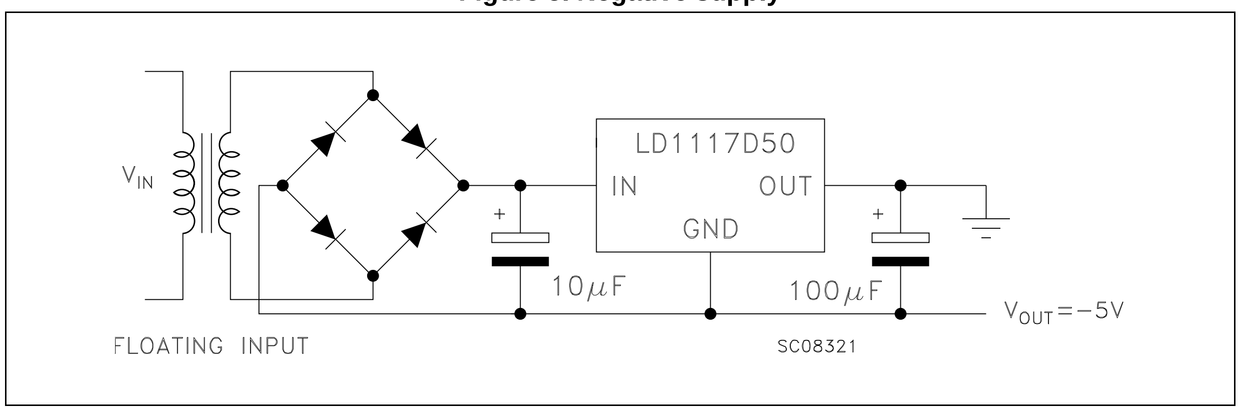


Figure 6. Circuit for increasing output voltage

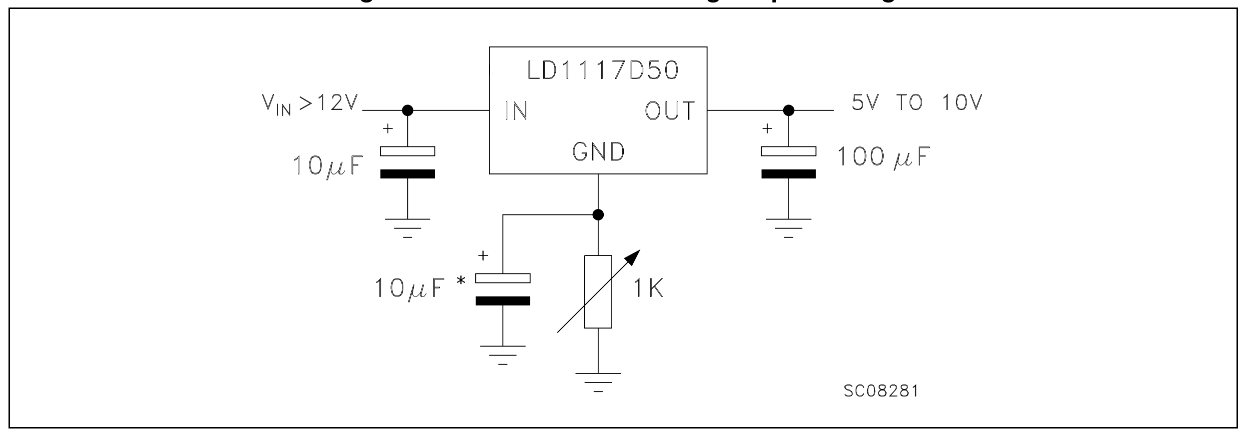


Figure 7. Voltage regulator with reference

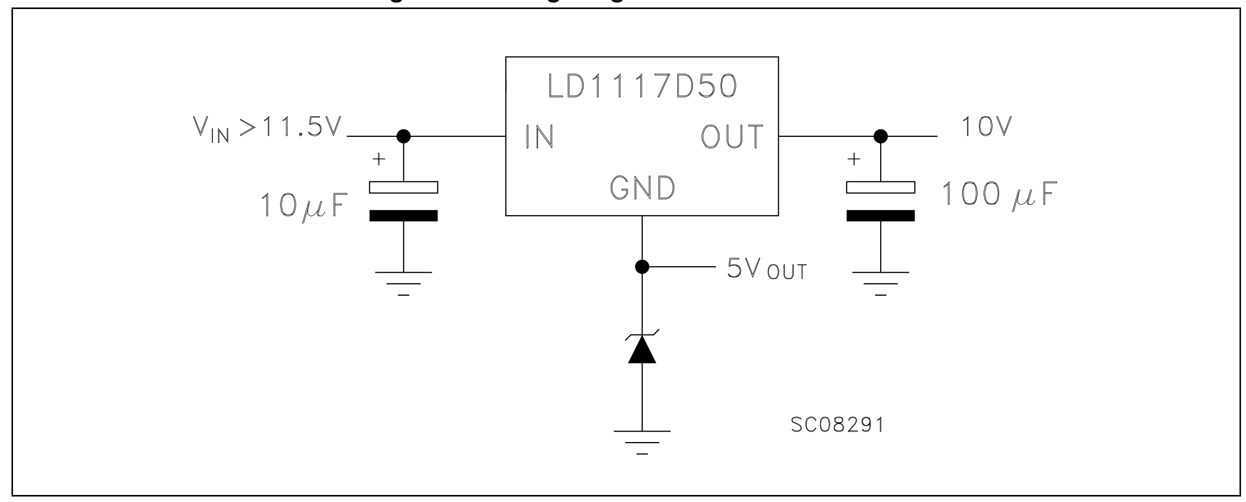


Figure 8. Battery backed-up regulated supply

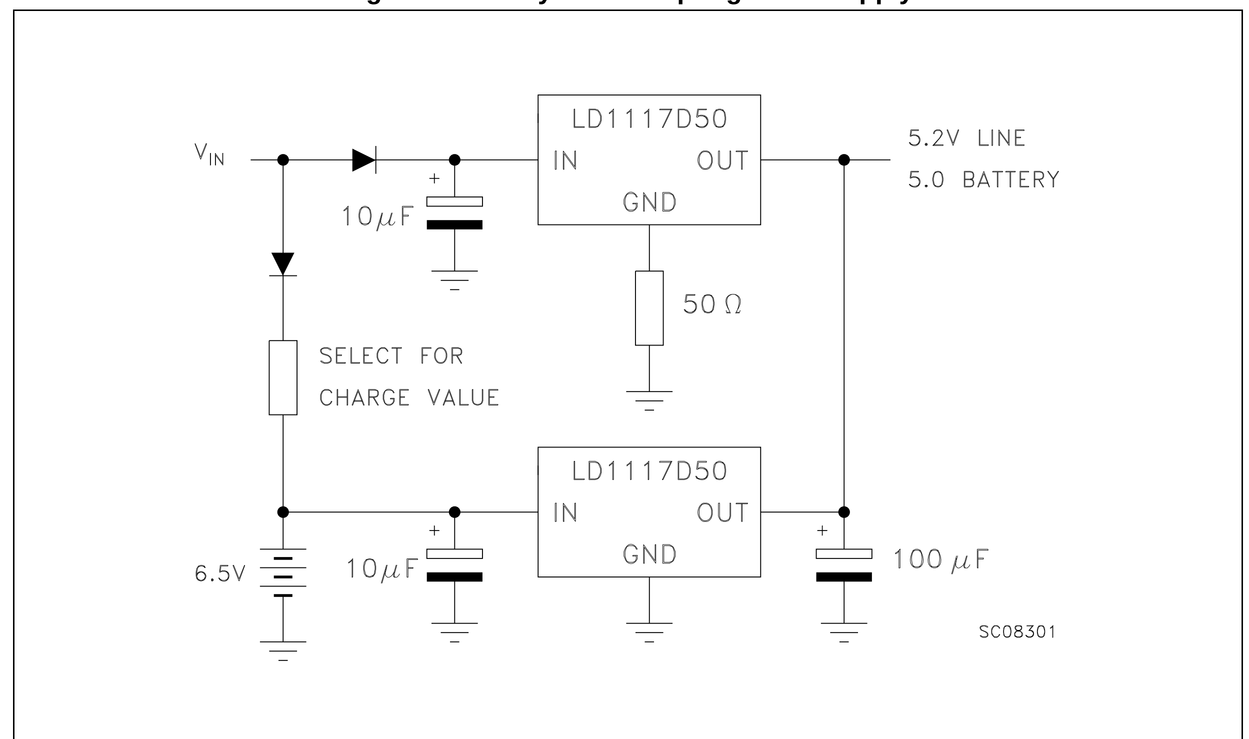
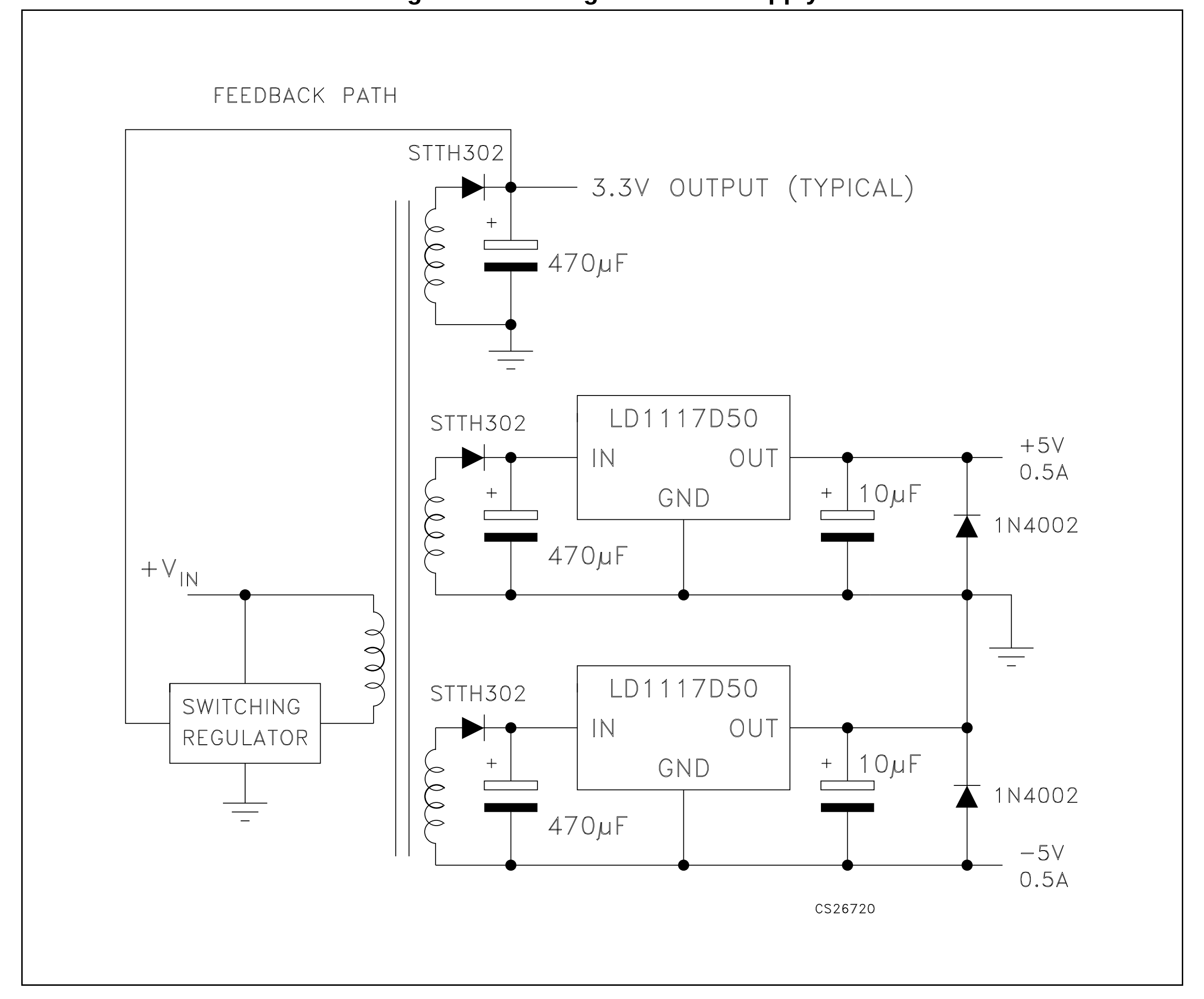


Figure 9. Post-regulated dual supply



7 LD1117 adjustable: application note

The LD1117 adjustable has a thermal stabilized 1.25 ± 0.012 V reference voltage between the OUT and ADJ pins. I_{ADJ} is 60 µA typ. (120 µA max.) and ΔI_{ADJ} is 1 µA typ. (5 µA max.).

R_1 is normally fixed to 120 Ω. From *Figure 9* we obtain:

$V_{OUT} = V_{REF} + R_2 (I_{ADJ} + I_{R1}) = V_{REF} + R_2 (I_{ADJ} + V_{REF} / R_1) = V_{REF} (1 + R_2 / R_1) + R_2 \times I_{ADJ}$.

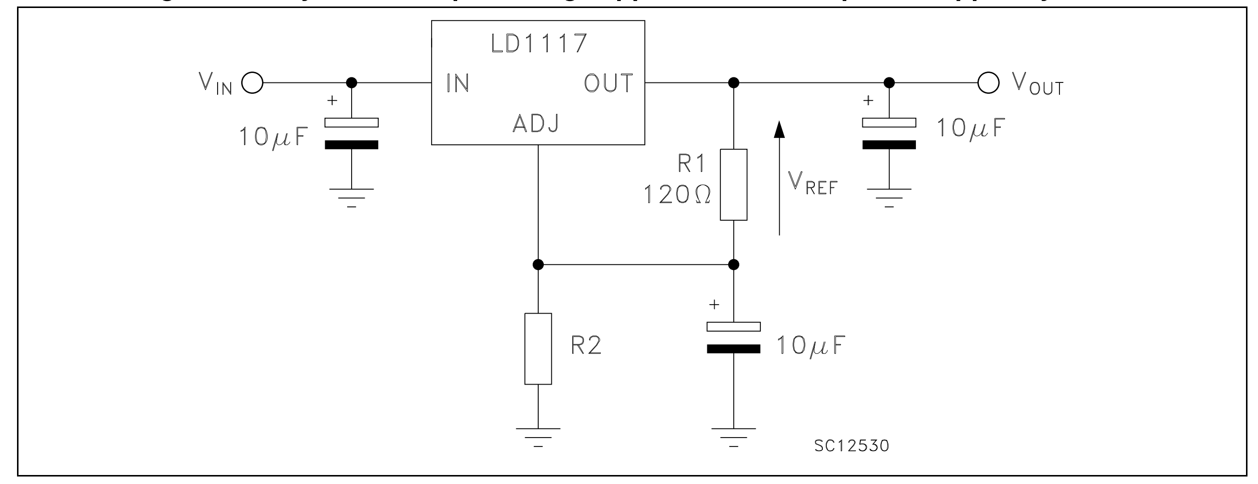
In normal application R_2 value is in the range of few kΩ, so the $R_2 \times I_{ADJ}$ product could not be considered in the V_{OUT} calculation; then the above expression becomes:

$V_{OUT} = V_{REF} (1 + R_2 / R_1)$.

In order to have the better load regulation it is important to realize a good Kelvin connection of R_1 and R_2 resistors. In particular R_1 connection must be realized very close to OUT and ADJ pin, while R_2 ground connection must be placed as near as possible to the negative Load pin. Ripple rejection can be improved by introducing a 10 µF electrolytic capacitor placed in parallel to the R_2 resistor (see *Figure 10*).

Figure 10. Adjustable output voltage application

Figure 11. Adjustable output voltage application with improved ripple rejection



8 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK® is an ST trademark.

Table 15. TO-220 mechanical data (type STD-ST Dual Gauge)

Dim.	mm		
	Min.	Typ.	Max.
A	4.40		4.60
b	0.61		0.88
b1	1.14		1.70
c	0.48		0.70
D	15.25		15.75
D1		1.27	
E	10		10.40
e	2.40		2.70
e1	4.95		5.15
F	1.23		1.32
H1	6.20		6.60
J1	2.40		2.72
L	13		14
L1	3.50		3.93
L20		16.40	
L30		28.90	
∅P	3.75		3.85
Q	2.65		2.95

Figure 12. Drawing dimension TO-220 (type STD-ST Dual Gauge)

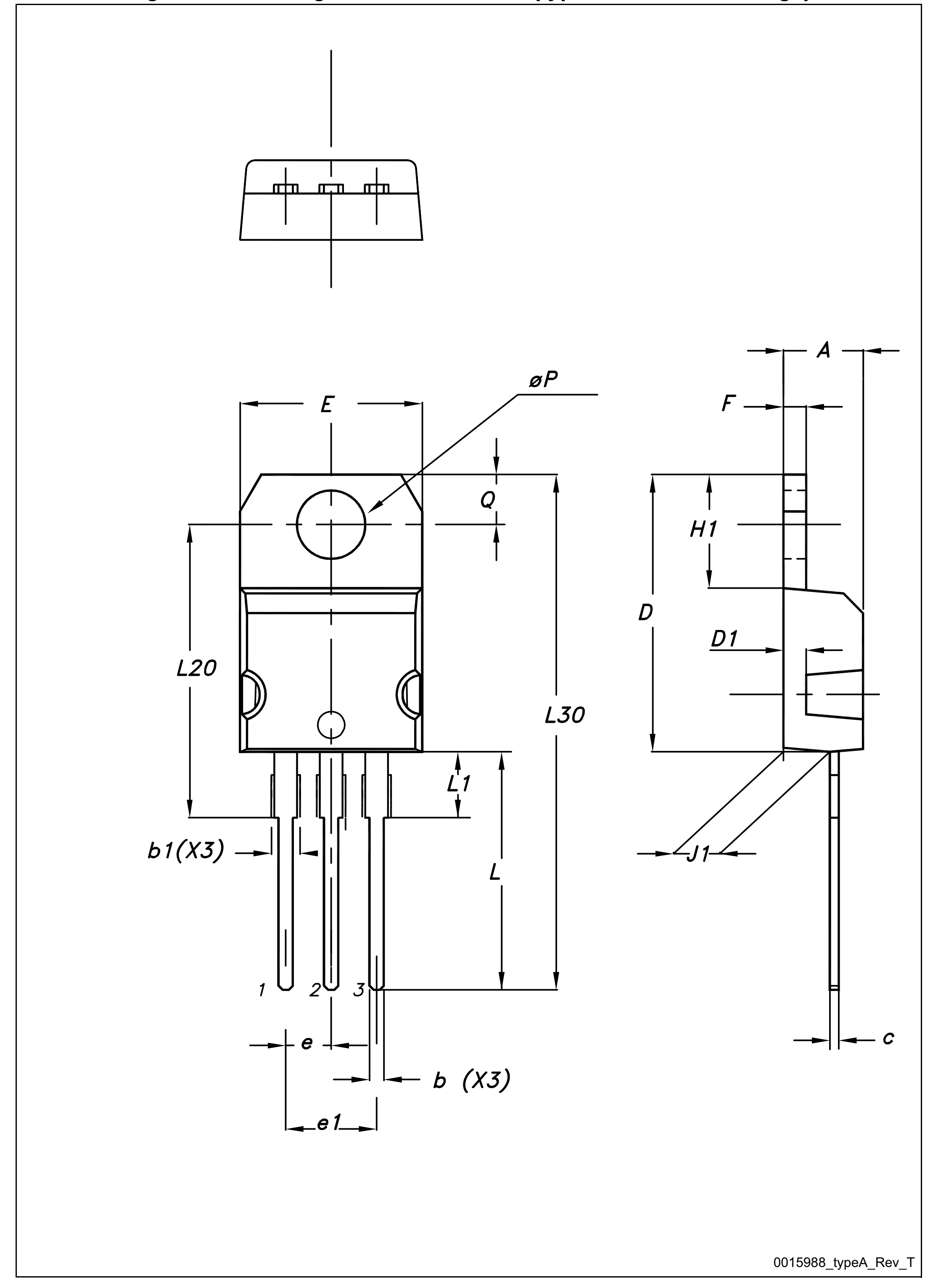


Table 16. TO-220 mechanical data (type STD-ST Single Gauge)

Dim.	mm		
	Min.	Typ.	Max.
A	4.40		4.60
b	0.61		0.88
b1	1.14		1.70
c	0.48		0.70
D	15.25		15.75
E	10		10.40
e	2.40		2.70
e1	4.95		5.15
F	0.51		0.60
H1	6.20		6.60
J1	2.40		2.72
L	13		14
L1	3.50		3.93
L20		16.40	
L30		28.90	
∅P	3.75		3.85
Q	2.65		2.95

Figure 13. Drawing dimension TO-220 (type STD-ST Single Gauge)

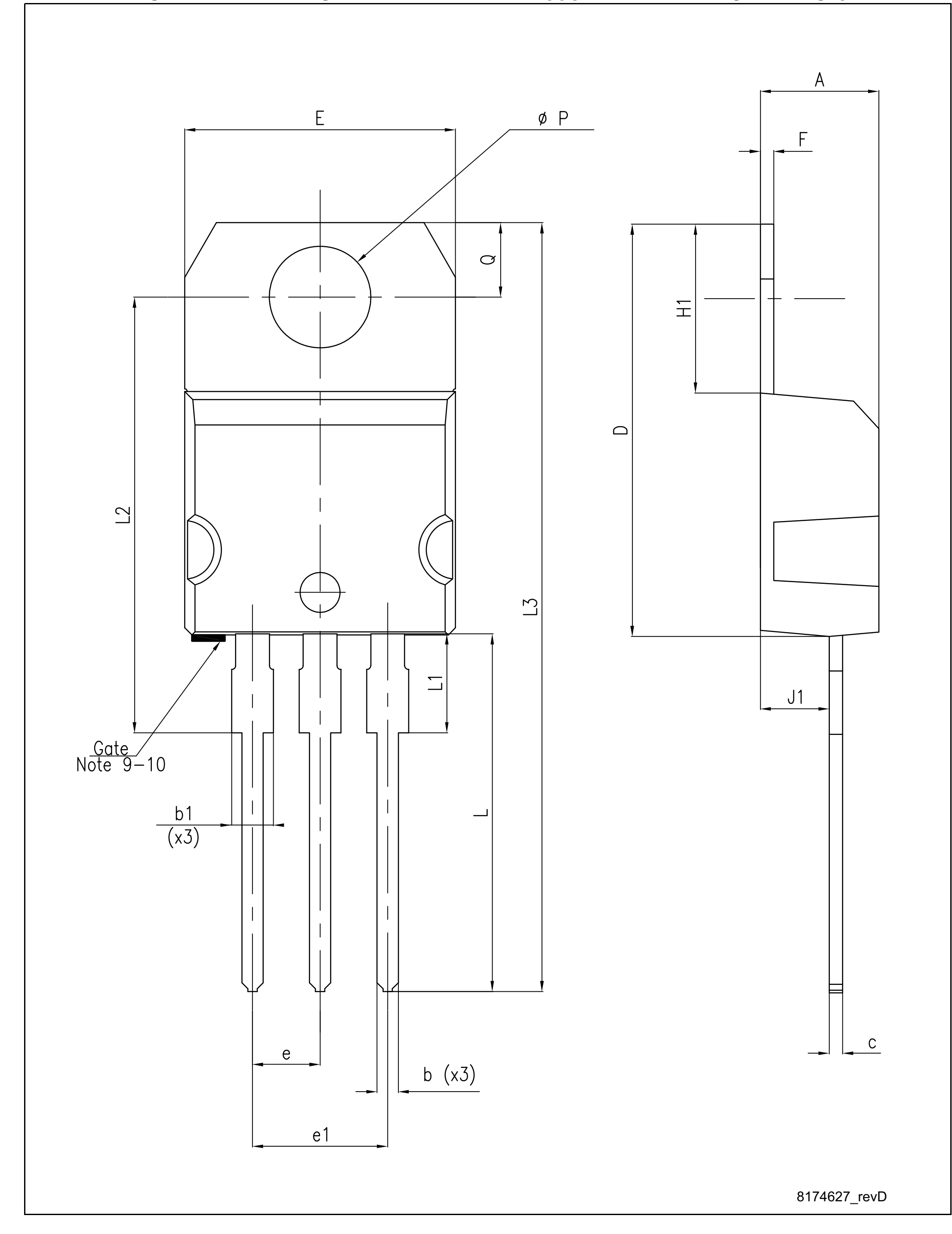


Table 17. SOT-223 mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A			1.80
A1	0.02		0.1
B	0.60	0.70	0.85
B1	2.90	3.00	3.15
c	0.24	0.26	0.35
D	6.30	6.50	6.70
e		2.30	
e1		4.60	
E	3.30	3.50	3.70
H	6.70	7.00	7.30
V			10°

Figure 14. Drawing dimension SOT-223

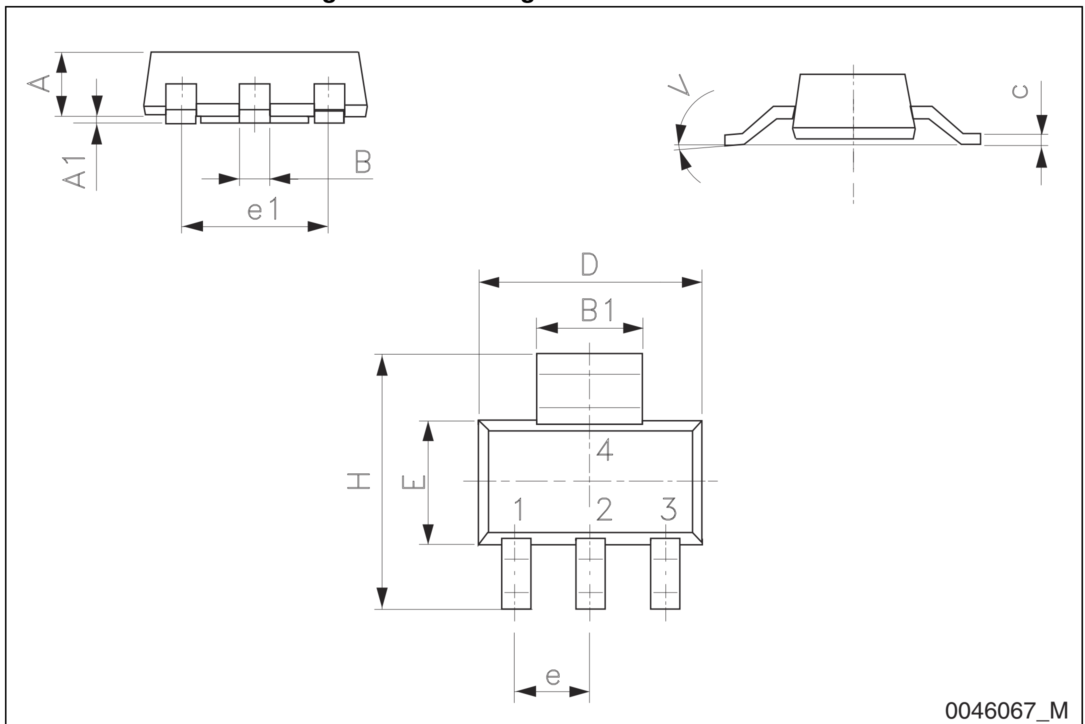


Table 18. SO-8 mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A			1.75
A1	0.10		0.25
A2	1.25		
b	0.28		0.48
c	0.17		0.23
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e		1.27	
h	0.25		0.50
L	0.40		1.27
L1		1.04	
k	0°		8°
ccc			0.10

Figure 15. Drawing dimension SO-8

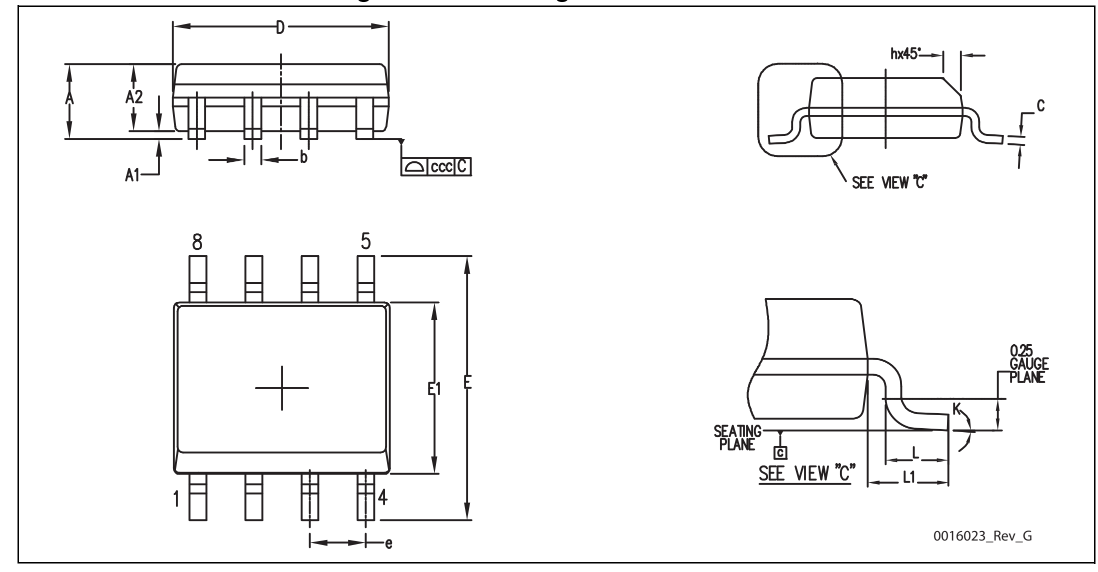
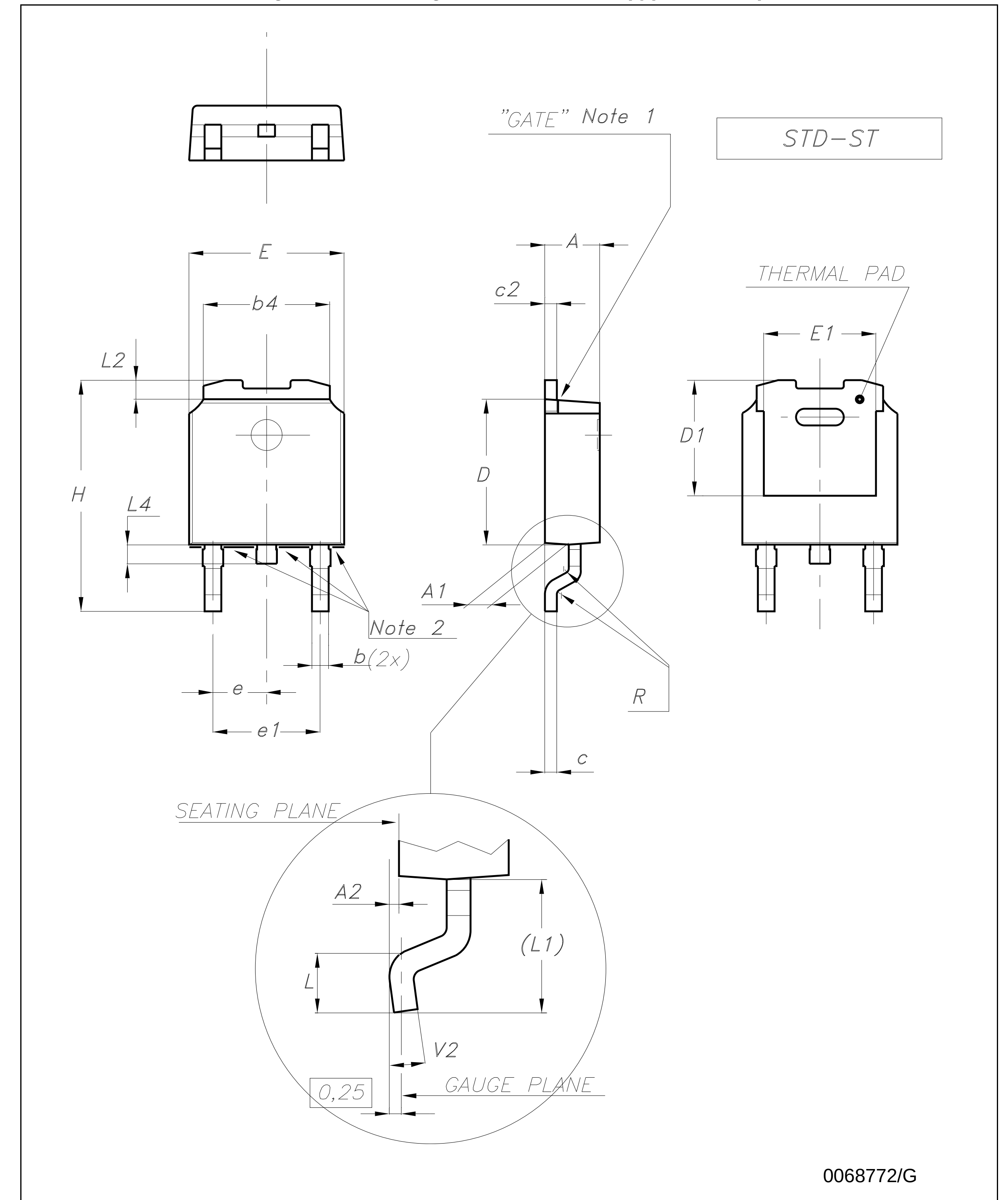


Table 19. DPAK mechanical data

Dim.	Type STD-ST			Type Fujitsu-subcon.			Type IDS-subcon		
	mm.			mm.			mm.		
	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.20		2.40	2.25	2.30	2.35	2.19		2.38
A1	0.90		1.10	0.96		1.06	0.89		1.14
A2	0.03		0.23	0		0.10	0.03		0.23
b	0.64		0.90	0.76		0.86	0.64		0.88
b4	5.20		5.40	5.28		5.38	5.21		5.46
c	0.45		0.60	0.46		0.56	0.46		0.58
c2	0.48		0.60	0.46		0.56	0.46		0.58
D	6.00		6.20	6.05		6.15	5.97		6.22
D1		5.10		5.27		5.47		5.20	
E	6.40		6.60	6.55	6.60	6.65	6.35		6.73
E1		4.70			4.77			4.70	
e		2.28		2.23	2.28	2.33		2.28	
e1	4.40		4.60				4.51		4.61
H	9.35		10.10	9.90		10.30	9.40		10.42
L	1.00			1.40		1.60	0.90		
L1		2.80					2.50		2.65
L2		0.80		1.03		1.13	0.89		1.27
L4	0.60		1.00	0.70		0.90	0.64		1.02
R		0.20			0.40			0.20	
V2	0°		8°	0°		8°	0°		8°

Note: The DPAK package coming from the two subcontractors (Fujitsu and IDS) are fully compatible with the ST's package suggested footprint.

Figure 16. Drawing dimension DPAK (type STD-ST)



Note: 1 Maximum resin gate protrusion: 0.5 mm.

2 Maximum resin protrusion: 0.25 mm.

Figure 17. Drawing dimension DPAK (type Fujitsu-subcon.)

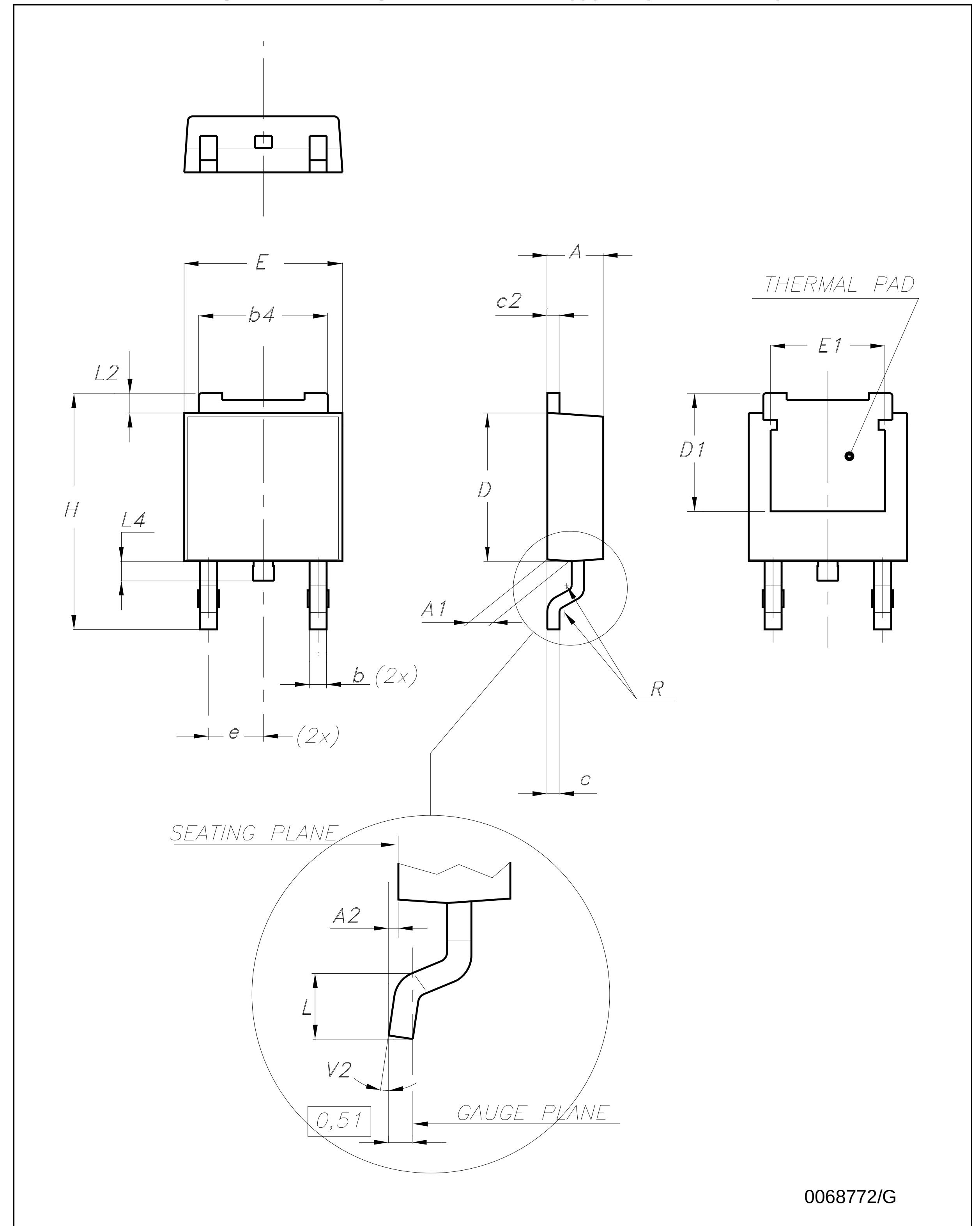


Figure 18. Drawing dimension DPAK (type IDS-subcon.)

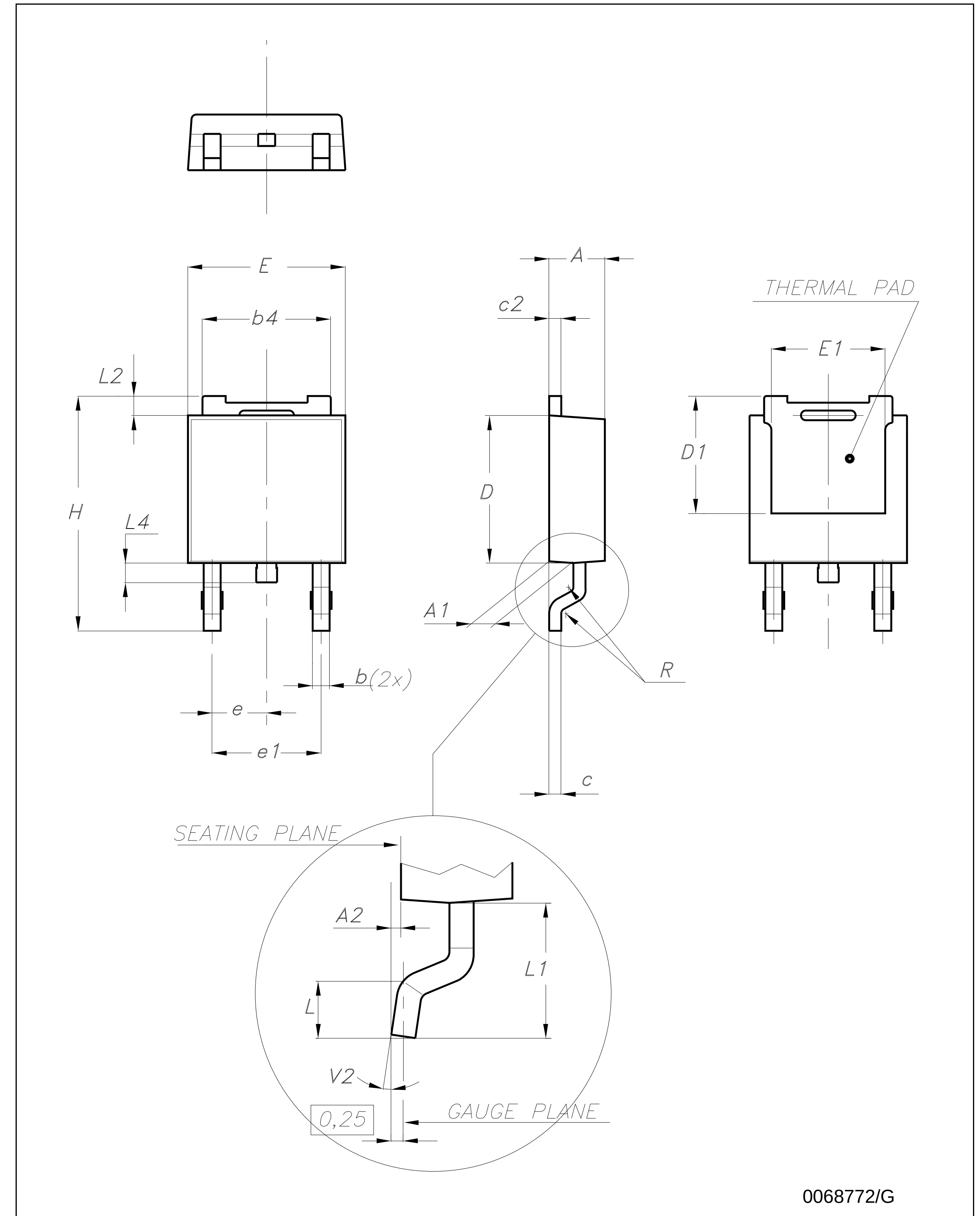
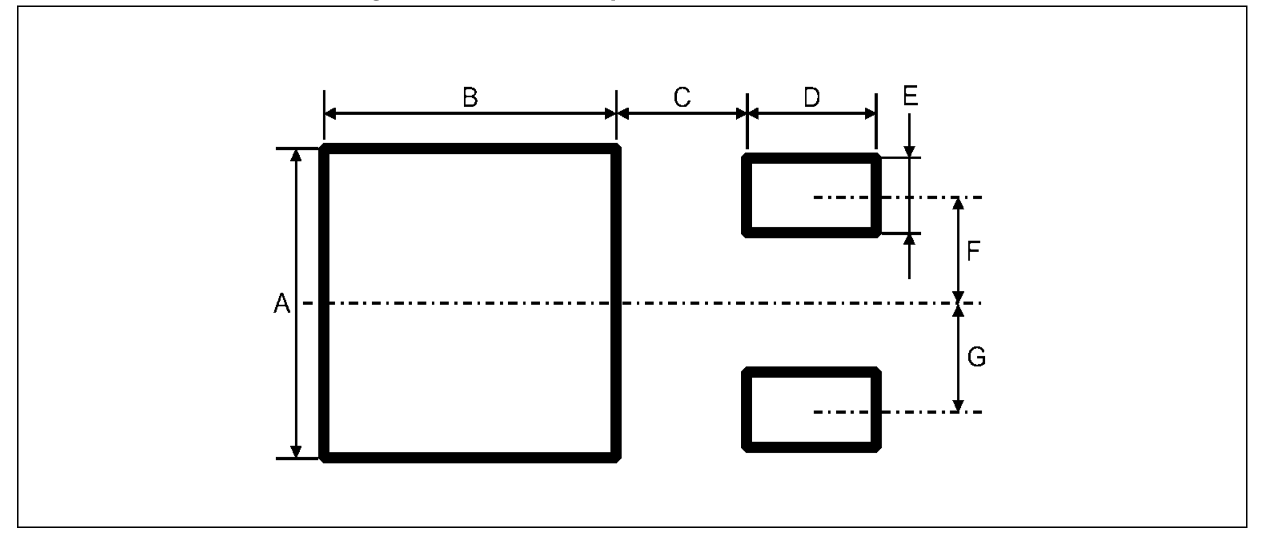


Table 20. Footprint data

	Values	
	mm.	inch.
A	6.70	0.264
B	6.70	0.64
C	1.8	0.070
D	3.0	0.118
E	1.60	0.063
F	2.30	0.091
G	2.30	0.091

Figure 19. DPAK footprint recommended data



9 Packaging mechanical data

Figure 20. Drawing dimension tube for TO-220 Dual Gauge (mm.)

5.5
MARKING SIDE
532 ±0.5
31.4 ±0.2
ø3.1 ±0.05
16.3 ±0.2
ø5.9 ±0.1
4.4
2.2
0.75 ±0.1
7 ±0.2
7 ±0.2
6.5 ±0.2
6.5 ±0.2
SECTION A–A
PRINTING AREA – SEE SPEC. DOC. Nr. 0062566
PRINT HEIGHT "A" = 3mm.
10
94
2
113
56

Figure 21. Drawing dimension tube for TO-220 Single Gauge (mm.)

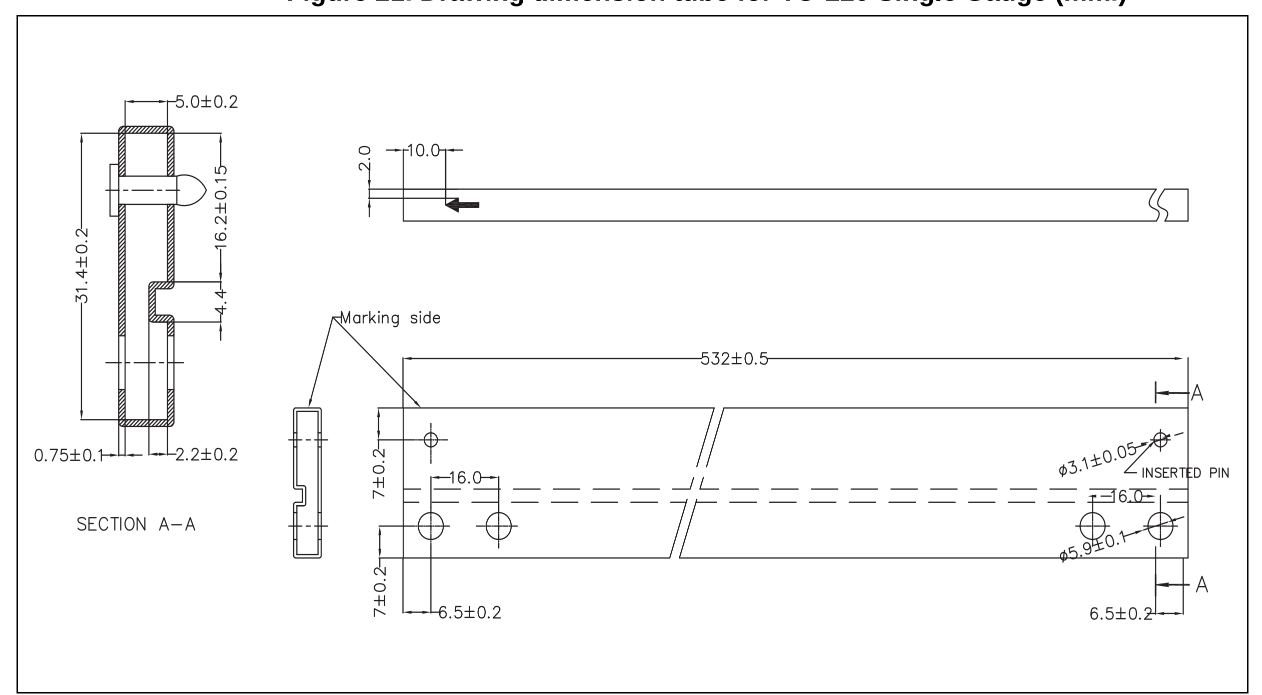
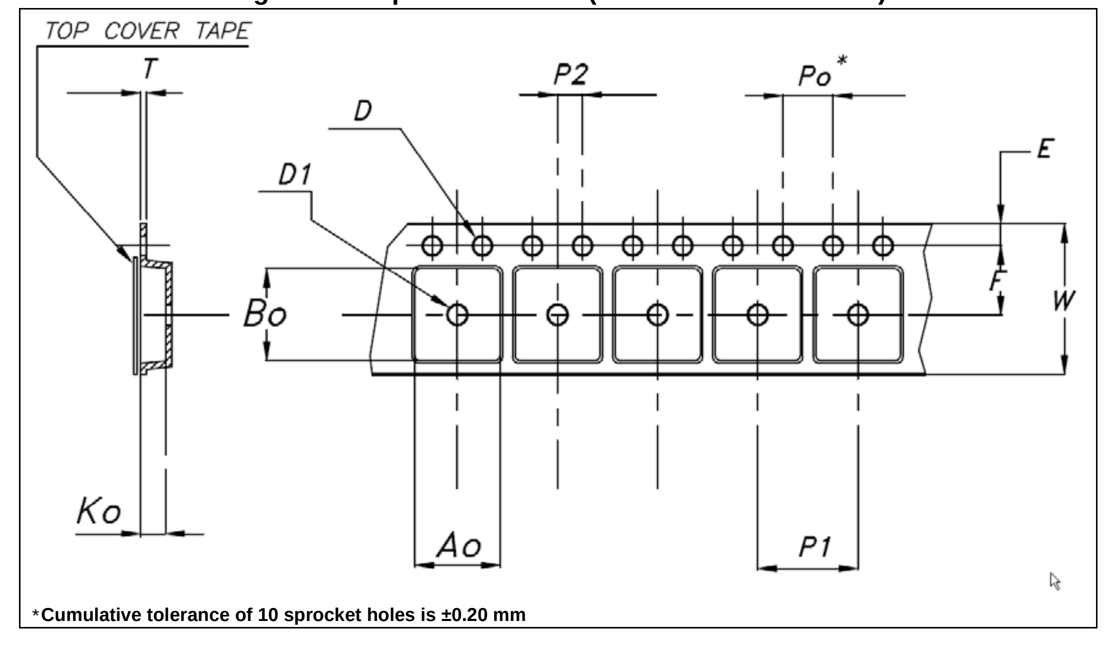


Table 21. SOT-223 tape and reel mechanical data

Tape				Reel		
Dim.	mm			Dim.	mm	
	Min.	Typ.	Max.		Min.	Max.
A0	6.75	6.85	6.95	A		180
B0	7.30	7.40	7.50	N	60	
K0	1.80	1.90	2.00	W1		12.4
F	5.40	5.50	5.60	W2		18.4
E	1.65	1.75	1.85	W3	11.9	15.4
W	11.7	12	12.3			
P2	1.90	2	2.10	Base quantity pcs		1000
P0	3.90	4	4.10	Bulk quantity pcs		1000
P1	7.90	8	8.10			
T	0.25	0.30	0.35			
Dϕ	1.50	1.55	1.60			
D1ϕ	1.50	1.60	1.70			

Figure 22. Tape for SOT-223 (dimensions are in mm)



*Cumulative tolerance of 10 sprocket holes is ±0.20 mm

Figure 23. Reel for SOT-223 (dimensions are in mm)

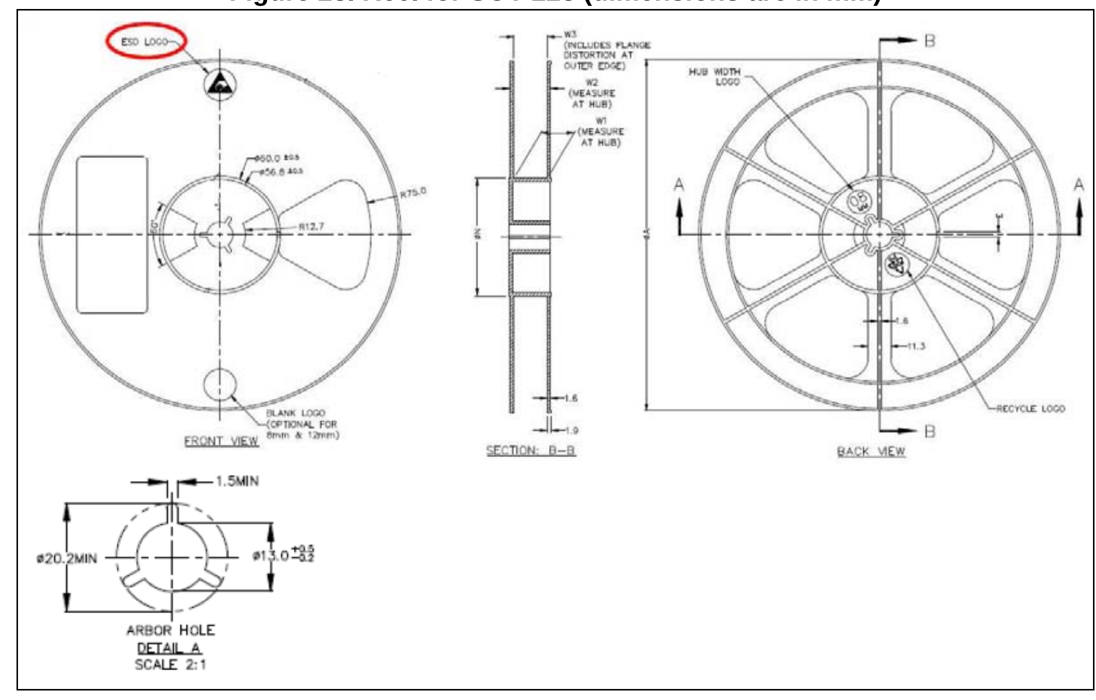


Table 22. SO-8 tape and reel mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A			330
C	12.8		13.2
D	20.2		
N	60		
T			22.4
Ao	8.1		8.5
Bo	5.5		5.9
Ko	2.1		2.3
Po	3.9		4.1
P	7.9		8.1

Figure 24. SO-8 tape and reel dimensions

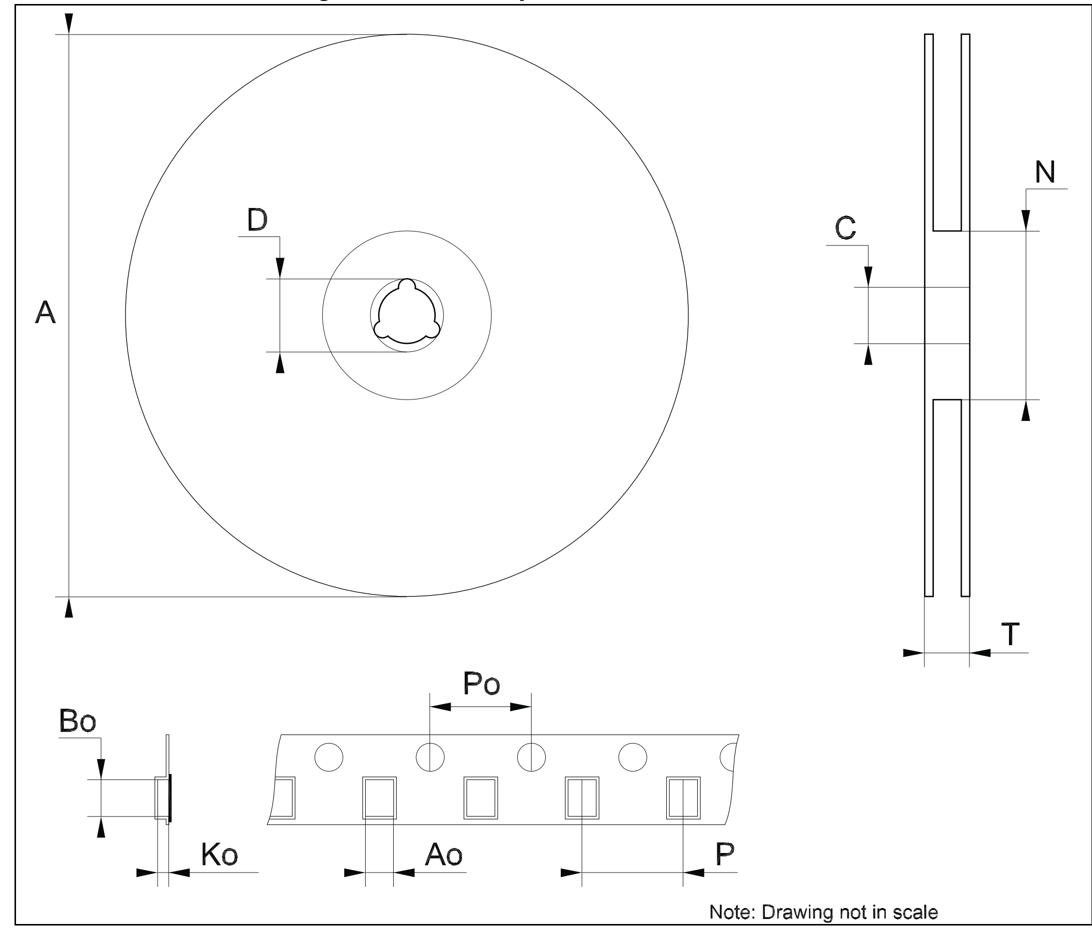
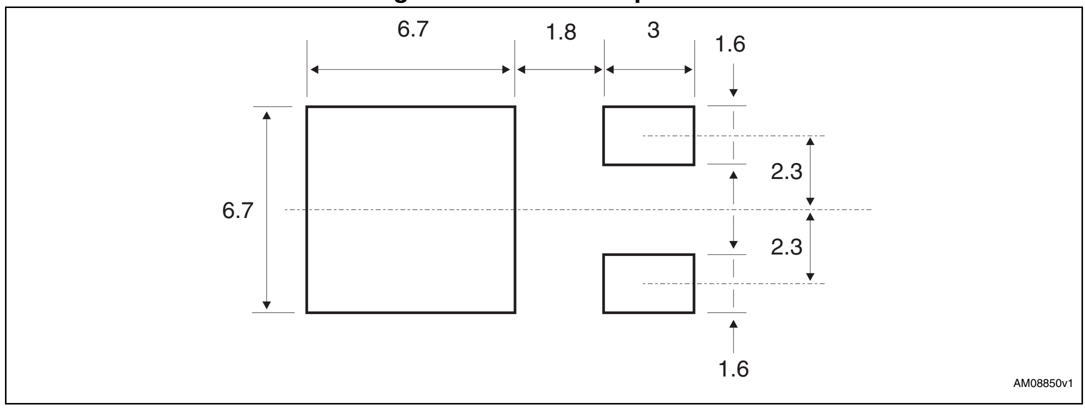


Table 23. DPAK tape and reel mechanical data

Tape			Reel		
Dim.	mm		Dim.	mm	
	Min.	Max.		Min.	Max.
A0	6.8	7	A		330
B0	10.4	10.6	B	1.5	
B1		12.1	C	12.8	13.2
D	1.5	1.6	D	20.2	
D1	1.5		G	16.4	18.4
E	1.65	1.85	N	50	
F	7.4	7.6	T		22.4
K0	2.55	2.75			
P0	3.9	4.1	Base qty.		2500
P1	7.9	8.1	Bulk qty.		2500
P2	1.9	2.1			
R	40				
T	0.25	0.35			
W	15.7	16.3			

Figure 25. DPAK footprint[a]



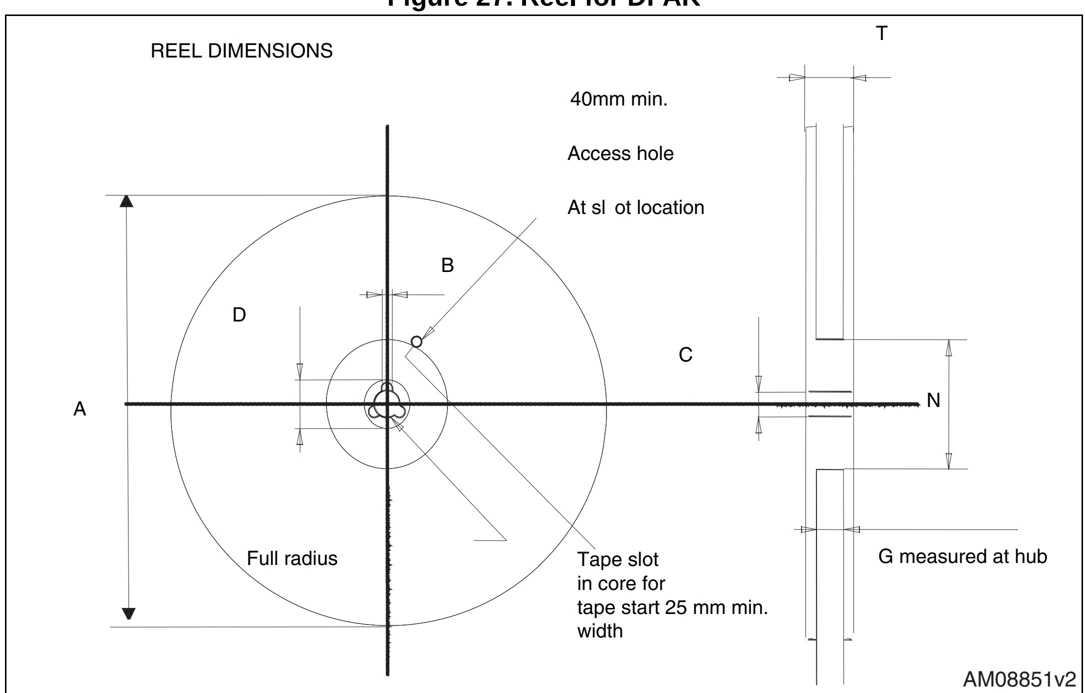
a. All dimensions are in millimeters

Figure 26. Tape for DPAK

10 pitches cumulative tolerance on tape +/- 0.2 mm
Top cover tape
T
P0
D
P2
E
F
W
B1
K0
B0
A0
P1
D1
For machine ref. only including draft and radii concentric around B0
User direction of feed
R
Bending radius
User direction of feed
AM08852v1



Figure 27. Reel for DPAK



10 Order codes

Table 24. Order codes

Packages					
SOT-223	**SO-8**	**DPAK (Tape and reel)**	**TO-220**	**TO-220 (Dual Gauge)**	**Output voltages**
LD1117S12TR		LD1117DT12TR			1.2 V
LD1117S12CTR		LD1117DT12CTR			1.2 V
LD1117S18TR		LD1117DT18TR	LD1117V18		1.8 V
LD1117S18CTR		LD1117DT18CTR			1.8 V
LD1117S25TR		LD1117DT25TR			2.5 V
LD1117S25CTR		LD1117DT25CTR			2.5 V
LD1117S33TR	LD1117D33TR	LD1117DT33TR	LD1117V33	LD1117V33-DG	3.3 V
				LD1117V33C-DG	3.3 V
LD1117S33CTR	LD1117D33CTR	LD1117DT33CTR	LD1117V33C		3.3 V
LD1117S50TR		LD1117DT50TR	LD1117V50	LD1117V50-DG	5 V
					5 V
LD1117S50CTR		LD1117DT50CTR	LD1117V50C		5 V
LD1117STR		LD1117DTTR	LD1117V	LD1117V-DG	ADJ from 1.25 to 15 V
					ADJ from 1.25 to 15 V
LD1117SC-R		LD1117DTC-R			ADJ from 1.25 to 15 V

11 Revision history

Table 25. Document revision history

Date	Revision	Changes
22-Sep-2004	15	Add new part number #12C; typing error: note on table 2.
25-Oct-2004	16	Add V_{ref} reference voltage on table 12.
18-Jul-2005	17	The DPAK mechanical data updated.
25-Nov-2005	18	The TO220FM package removed.
14-Dec-2005	19	The T_{op} on table 2 updated.
06-Dec-2006	20	DPAK mechanical data updated and added footprint data.
05-Apr-2007	21	Order codes updated.
30-Nov-2007	22	Added *Table 1*.
16-Apr-2008	23	Modified: *Table 24 on page 42*.
08-Jul-2008	24	Added note *1. on page 7*.
30-Mar-2009	25	Modified: V_{IN} max value *Table 4 on page 10* and *Figure 9 on page 23*.
29-Jul-2009	26	Modified: *Table 24 on page 42*.
03-Feb-2010	27	Modified *Table 9 on page 15*.
22-Mar-2010	28	Added: *Table 16 on page 22*, *Figure 13 on page 23*, *Figure 14 on page 24*, *Figure 17* and *Figure 18 on page 33*.
15-Nov-2010	29	Modified: R_{thJC} value for TO-220 *Table 2 on page 7*.
30-Nov-2011	30	Added: order code LD1117V33-DG *Table 24 on page 42*.
13-Feb-2012	31	Added: order codes LD1117V50-DG and LD1117V-DG *Table 24 on page 42*.
19-Oct-2012	32	Added: R_{thJA} value for DPAK, SOT-223 and SO-8*Table 2 on page 7*.
20-Nov-2013	33	Part number LD1117xx changed to LD1117. Updated the Description in cover page, *Section 8: Package mechanical data* and *Table 24: Order codes*. Cancelled Table 1: Device summary. Added *Section 9: Packaging mechanical data*. Minor text changes.

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